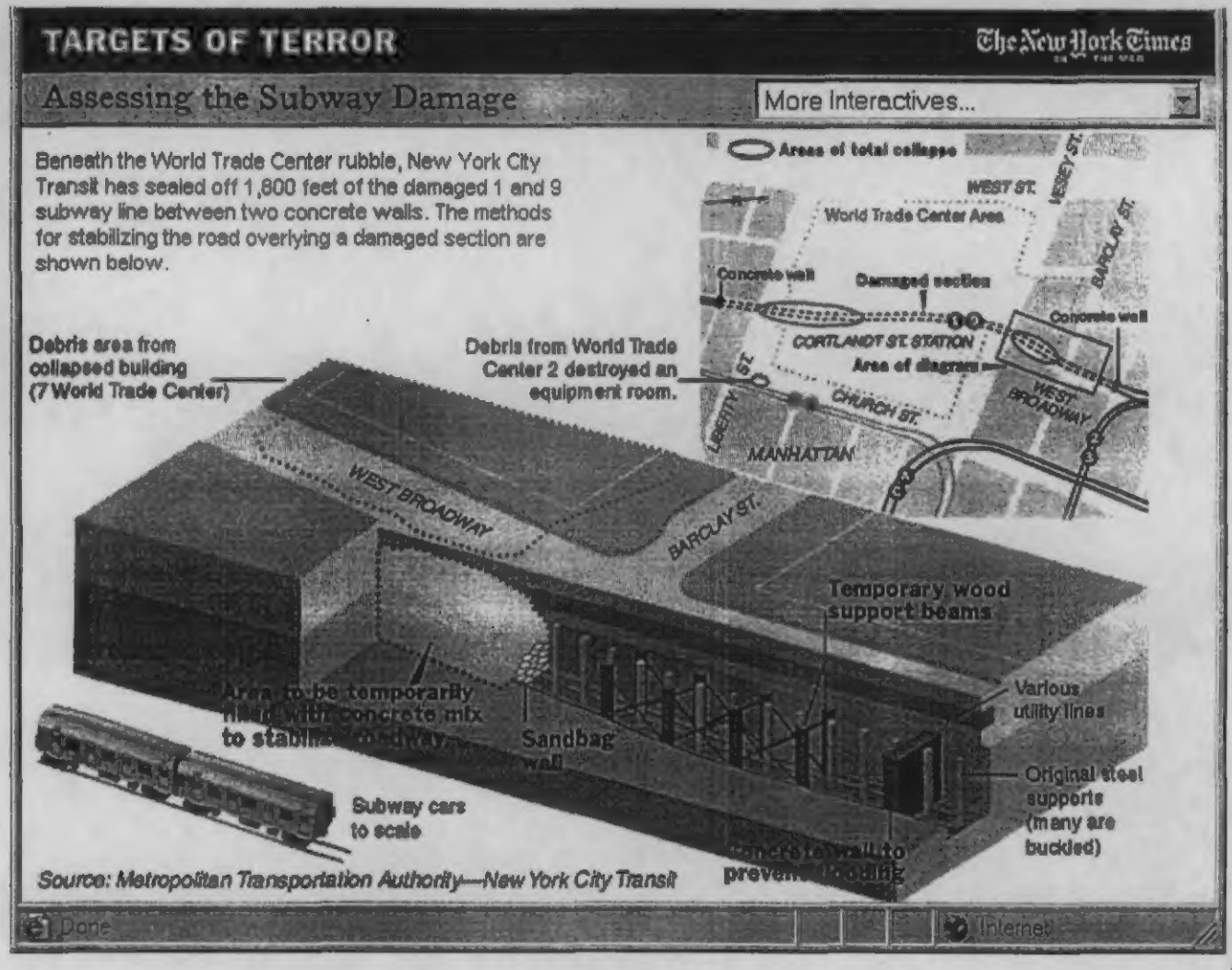
Subway Damage



ARA

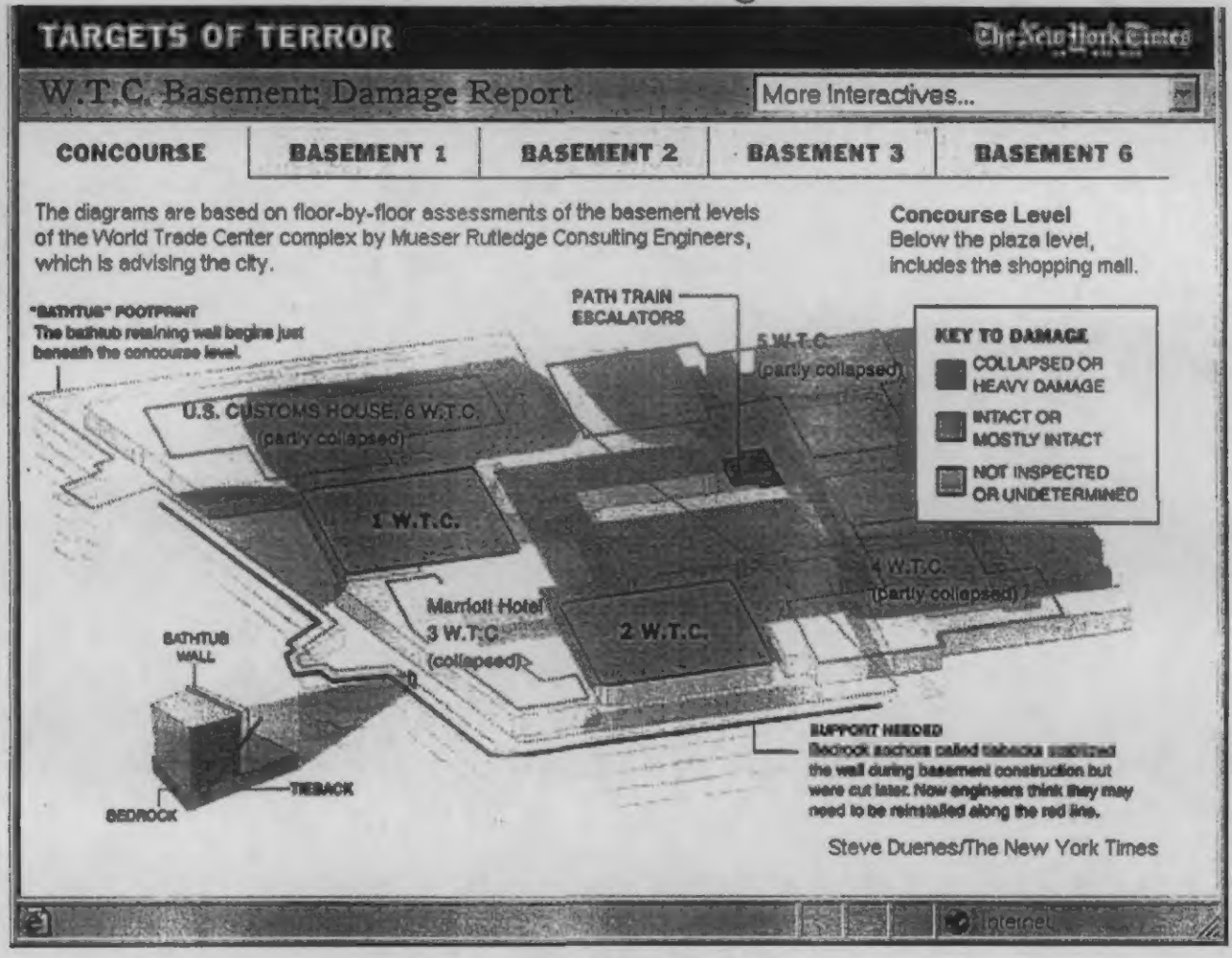
007581-25

SGH 000626

WTCI-93-W&C

World Trade Center Plaza

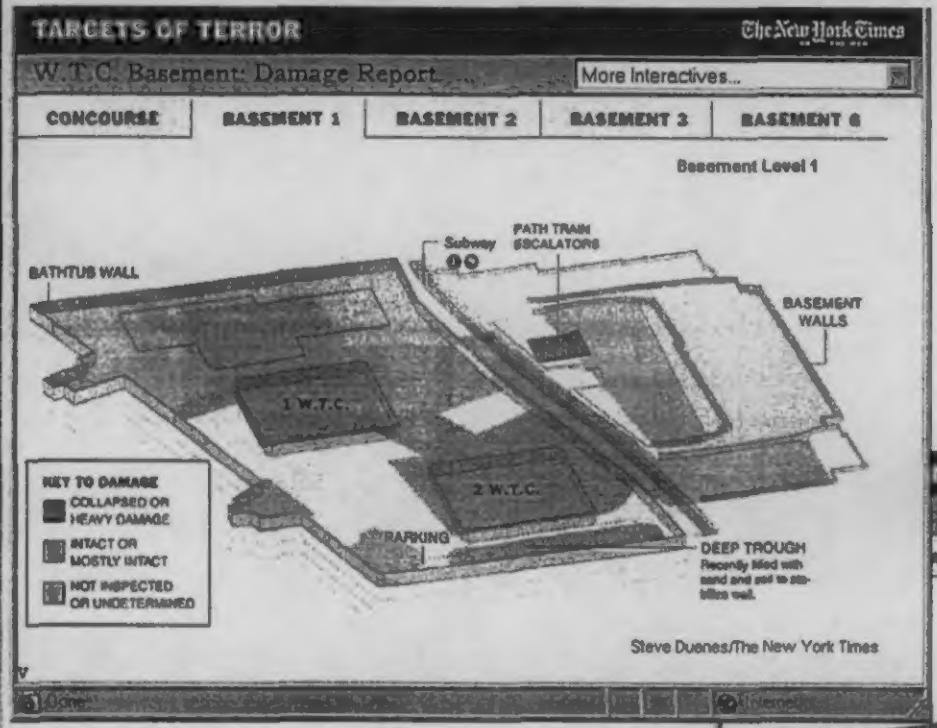
Basements Damage



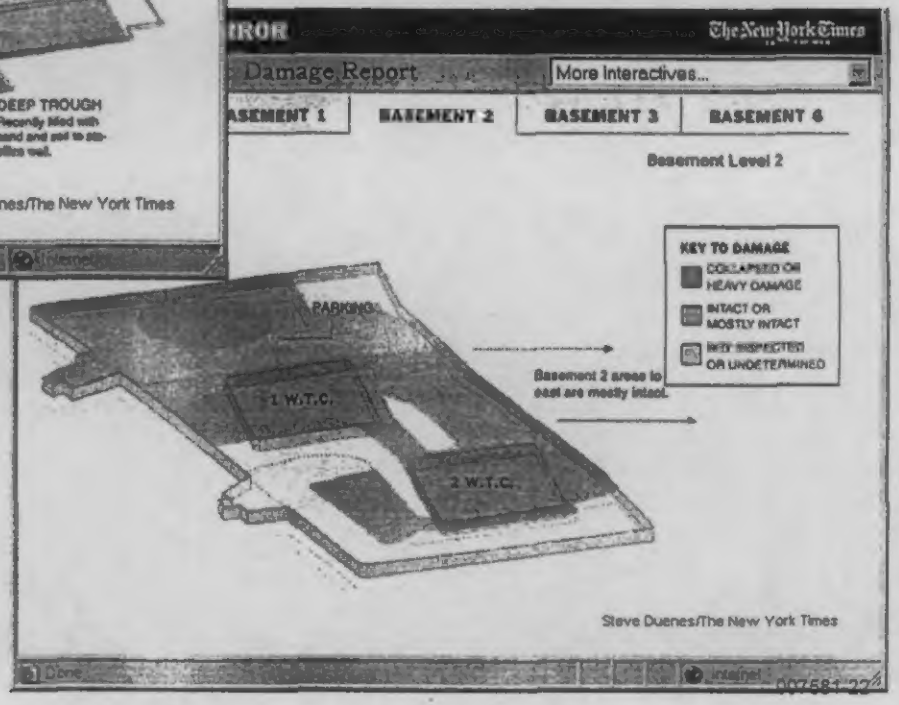
SCH 000627

ARA

World Trade Center Plaza

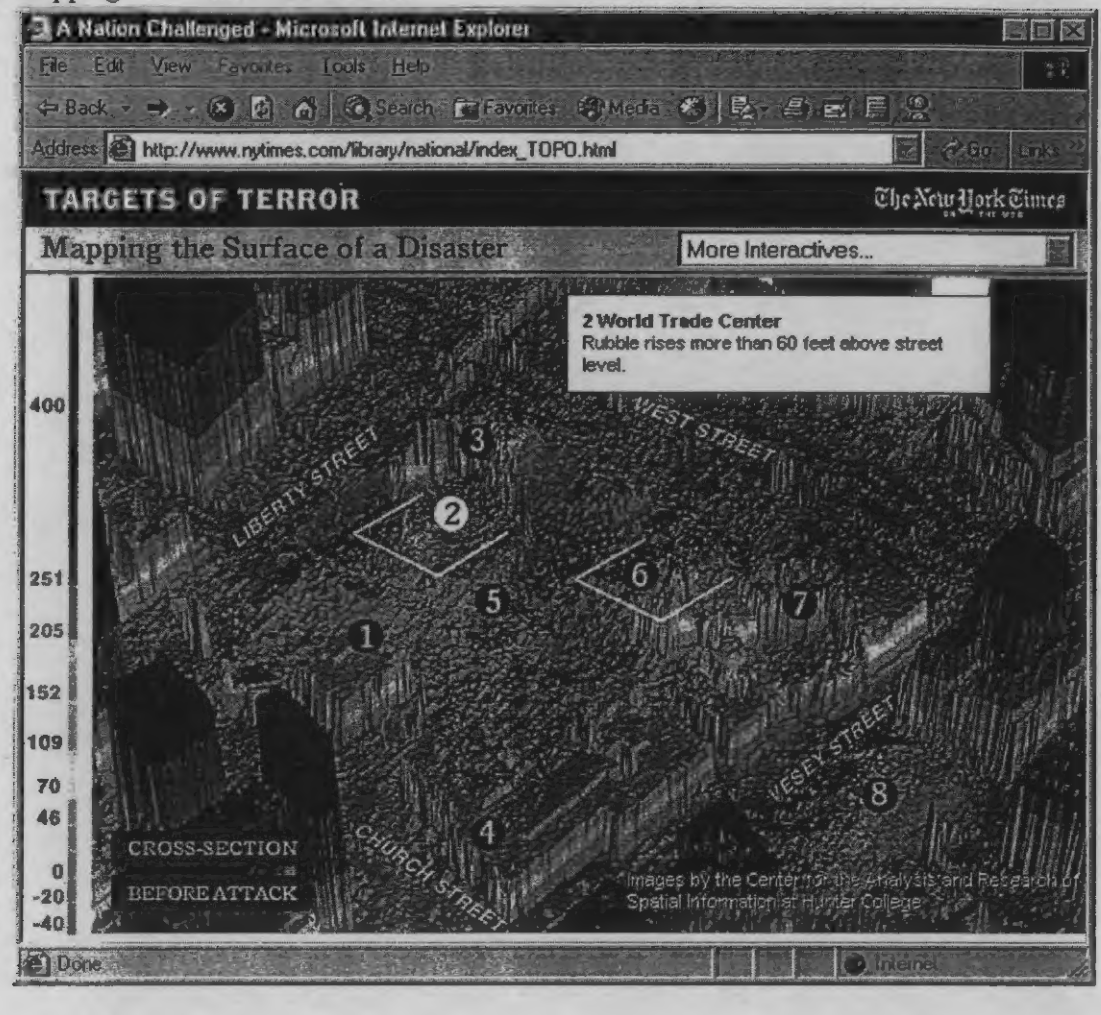


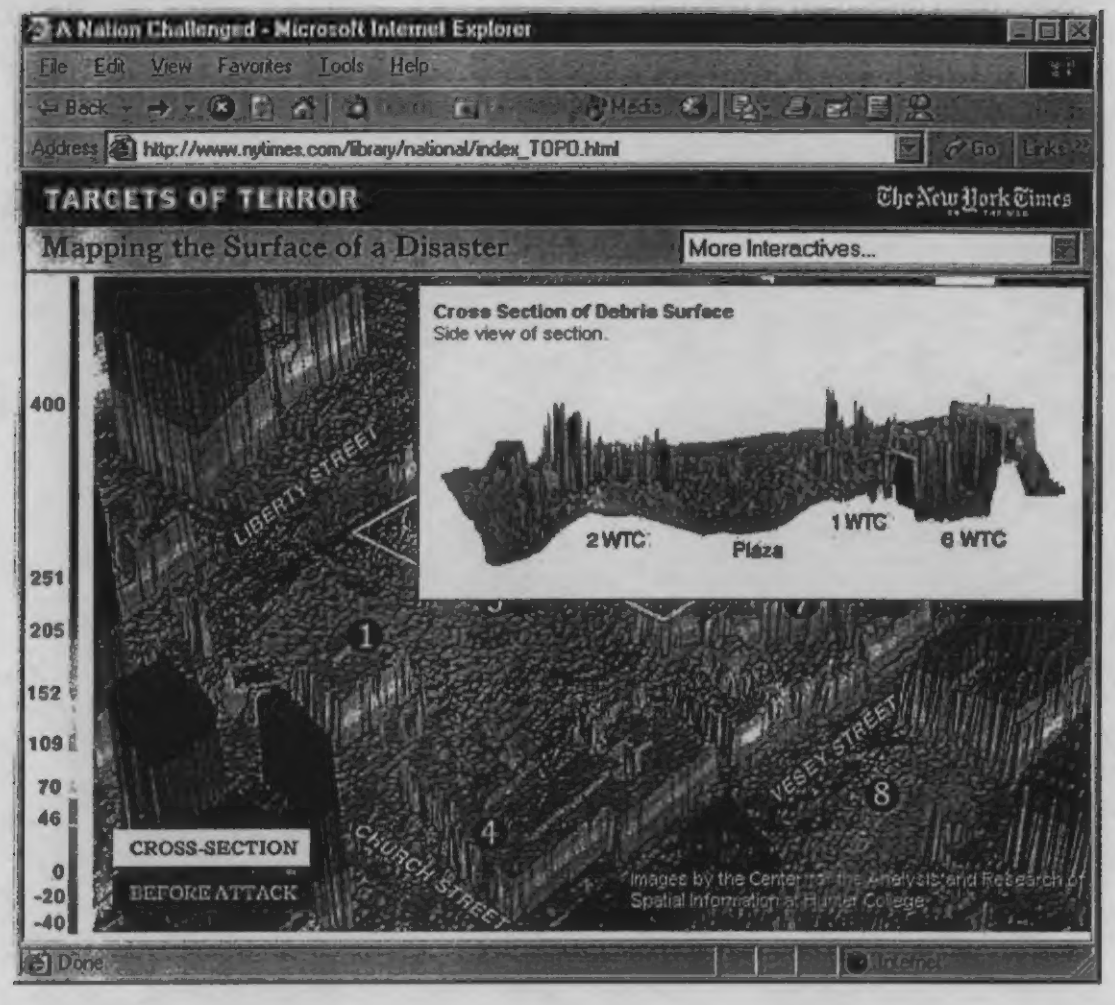
Basements Damage



SGH 000628

mapping the surface of a disaster

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Side view of section.
2 WTC
Plaza
1 WTC
6 WTC
400
251
205
152
109
70
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0
-20
-40
LIBERTY STREET
VESEY STREET
CHURCH STREET
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CROSS-SECTION
BEFORE ATTACK
Images by the Center for the Analysis and Research of Spatial Information at Hunter College
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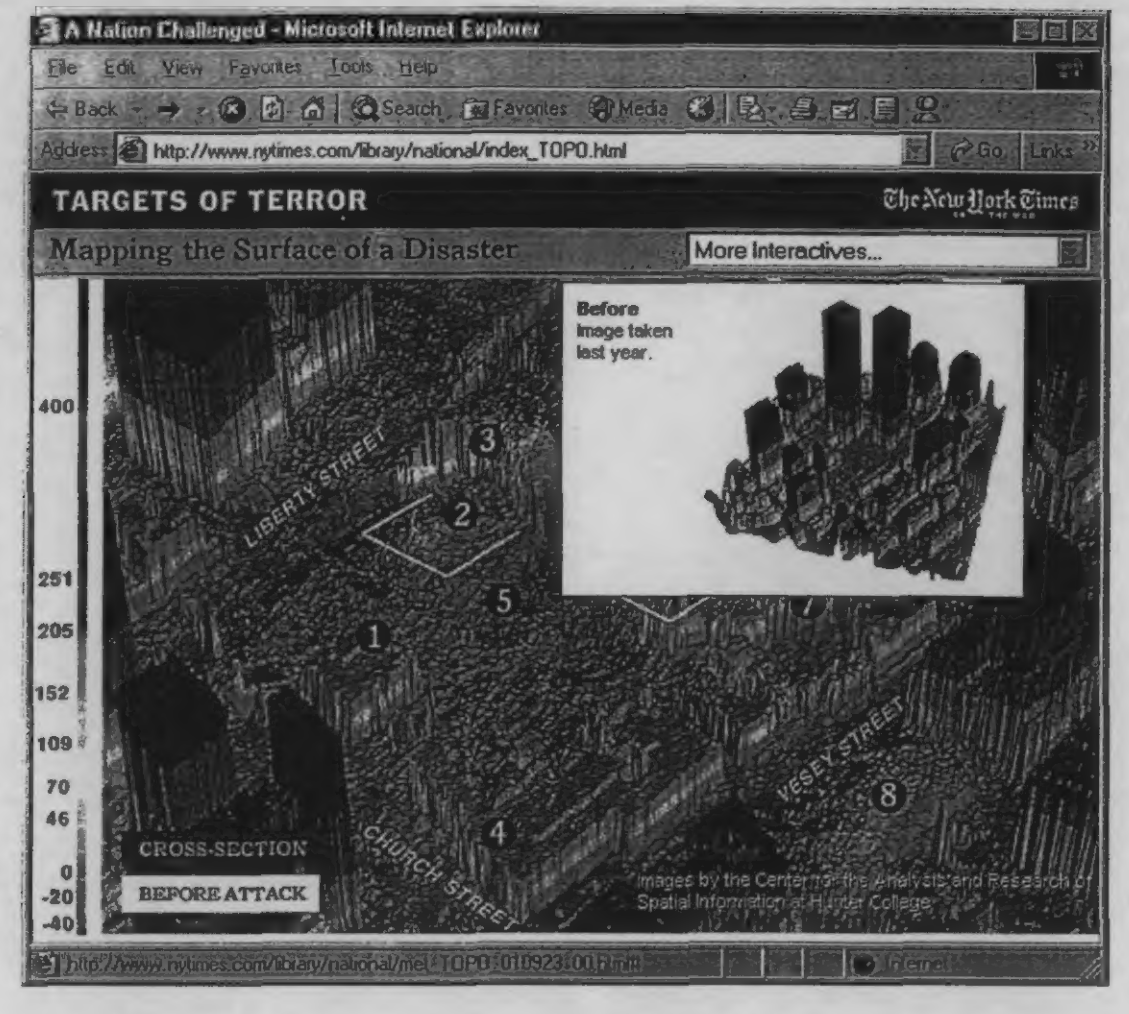
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Before
Image taken
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LIBERTY STREET
CHURCH STREET
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CROSS-SECTION
BEFORE ATTACK
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By TOM ZELLER

The grand physical imprint of a disaster is often a fleeting thing. Shattered glass is swept, gaping black holes mended, snarls of steel and mortar raked. But subtle and perhaps more harrowing inscriptions remain, including one that was quietly etched into existence some 25 miles from lower Manhattan and the terrorist attacks that toppled two skyscrapers.

Columbia University's Lamont-Doherty Earth Observatory in Palisades, N.Y., has been monitoring seismic activity in the northeastern United States since the early 1970's, and at 8:46 a.m. last Tuesday, its needle wiggled. Eighteen minutes later, another twitch. A third — this one a bit stronger, more sustained — followed at 9:59 a.m. And precisely 29 minutes after that, a final pulse.

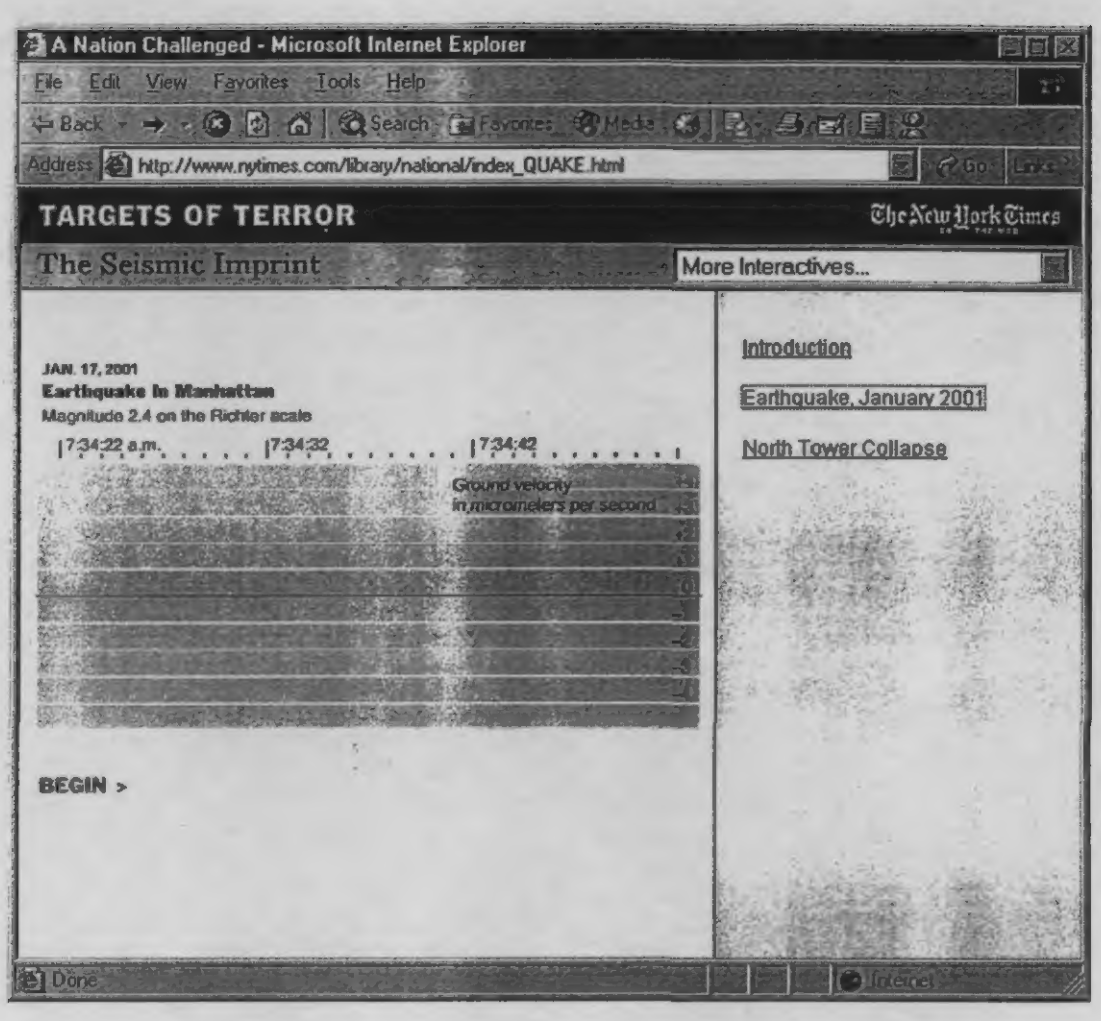
Then it was over.

"In this field, we often have to look at seismograms and know that these waves represent the deaths of a lot of people," said John Armbruster, a scientist at the observatory. "The sad thing is that usually we're dealing with a natural event like an earthquake."

The series of tremors generated by the unfolding attacks at the World Trade Center were relatively small. The final collapse delivered a mild Richter blow not unlike the mini-quake some New Yorkers might have felt earlier this year — a mere bump, in seismic terms. And both events scratched fairly low-ranking, albeit lasting testaments to the speed, amplitude and duration of their rumbling.

But the quake's reading, for all of its dramatic peaks and valleys, is really little more than a mindless scribble — dumb, unknowing, without purpose. The tower's imprint, on the other hand — less rapid and not as deep — seems a sad, sinister tracing of intent and tragedy.

"An earthquake is something that gets out of the earth and into a building," Mr. Armbruster said. "But this event began with a building, was caused by human activity, and a subsequent effect leaked into the earth."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Earthquake in Manhattan
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7:34:22 a.m.
7:34:32
7:34:42
Ground velocity in micrometers per second
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North Tower Collapse
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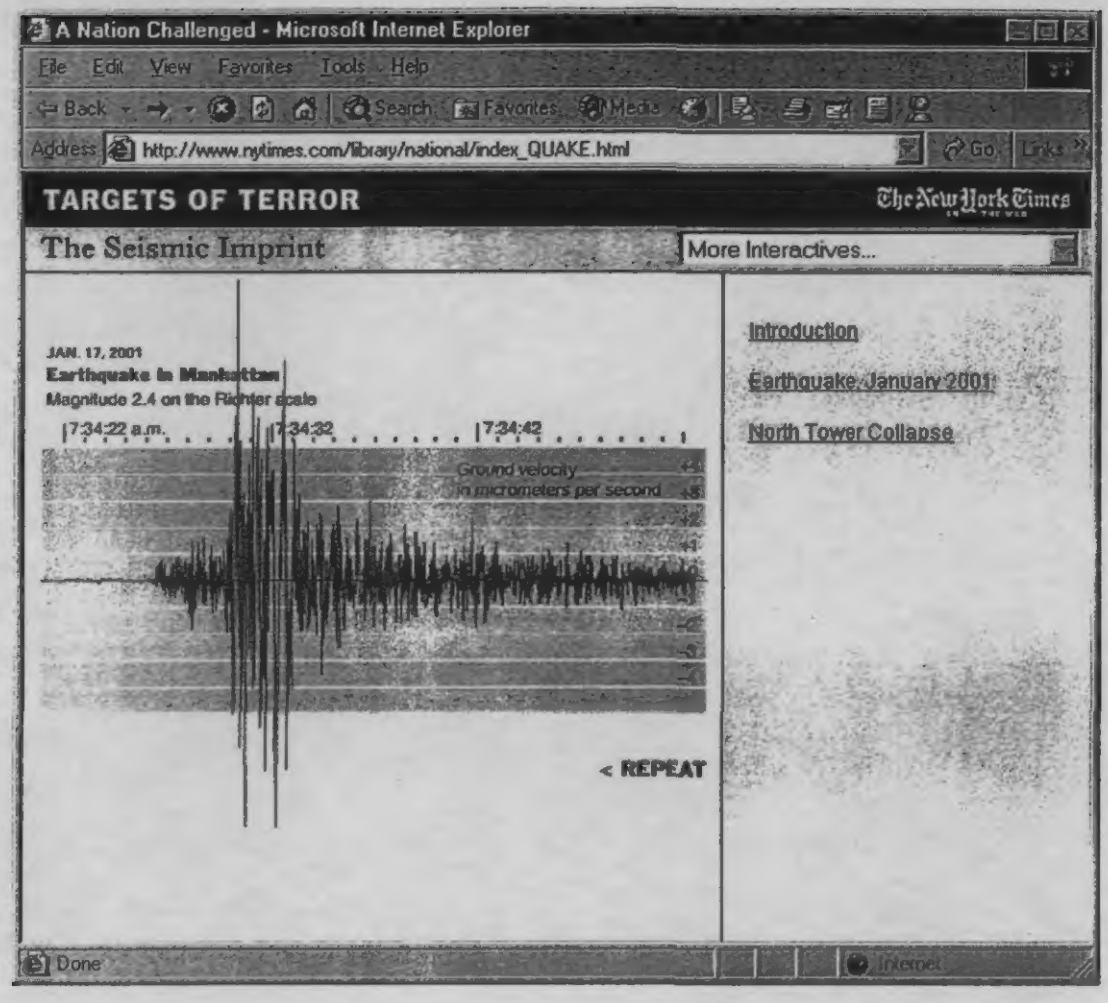
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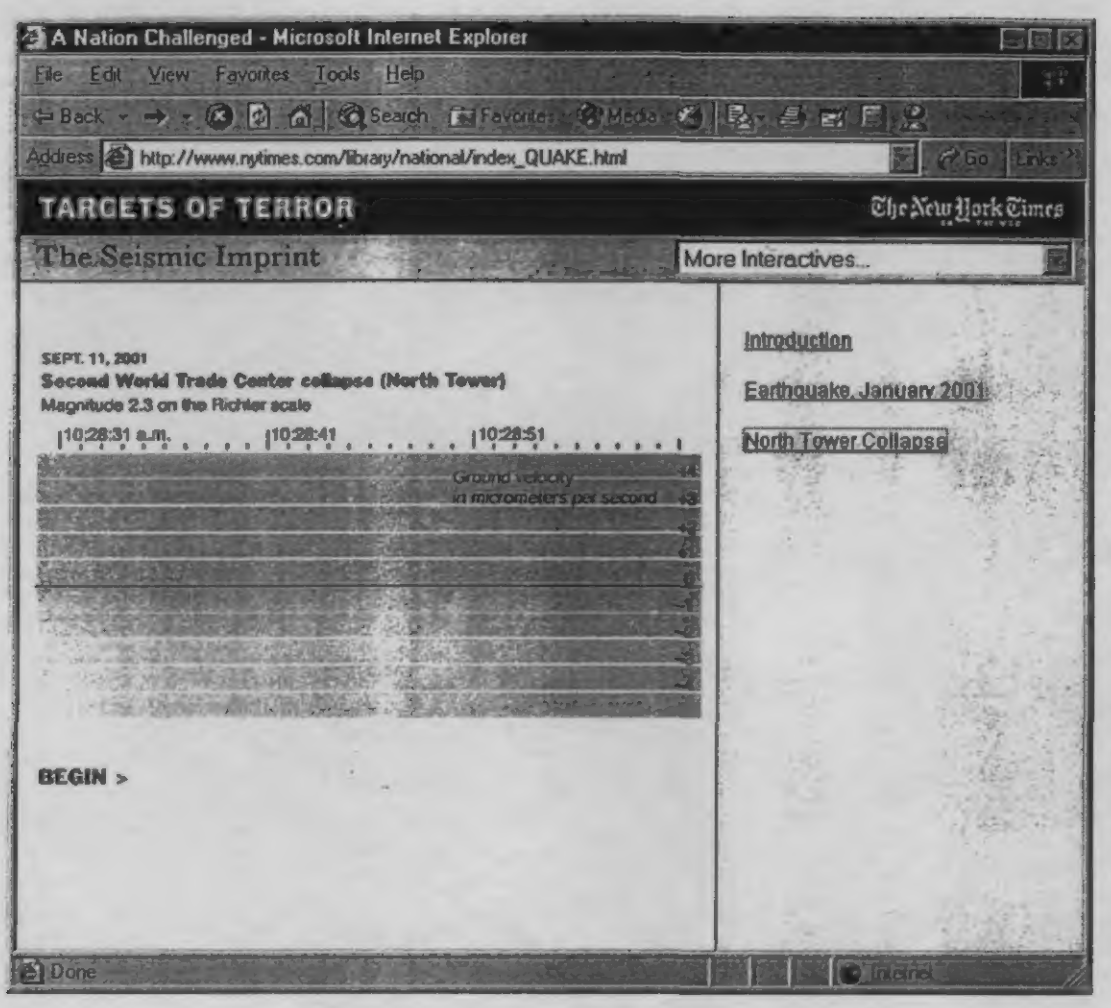
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Second World Trade Center collapse (North Tower)
Magnitude 2.3 on the Richter scale
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10:28:41
10:28:51
Ground velocity
in micrometers per second
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Introduction
Earthquake, January 2001
North Tower Collapse
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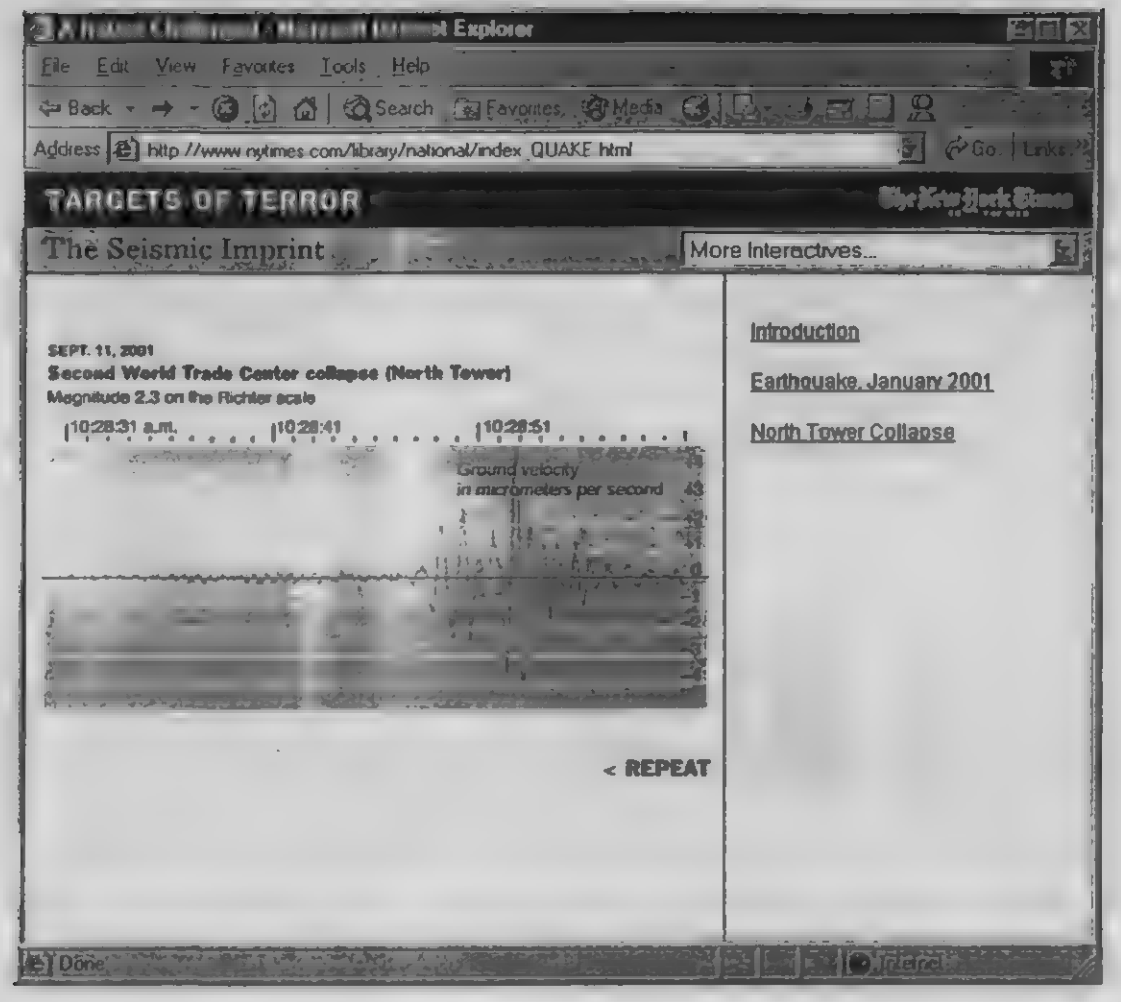
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Ground velocity
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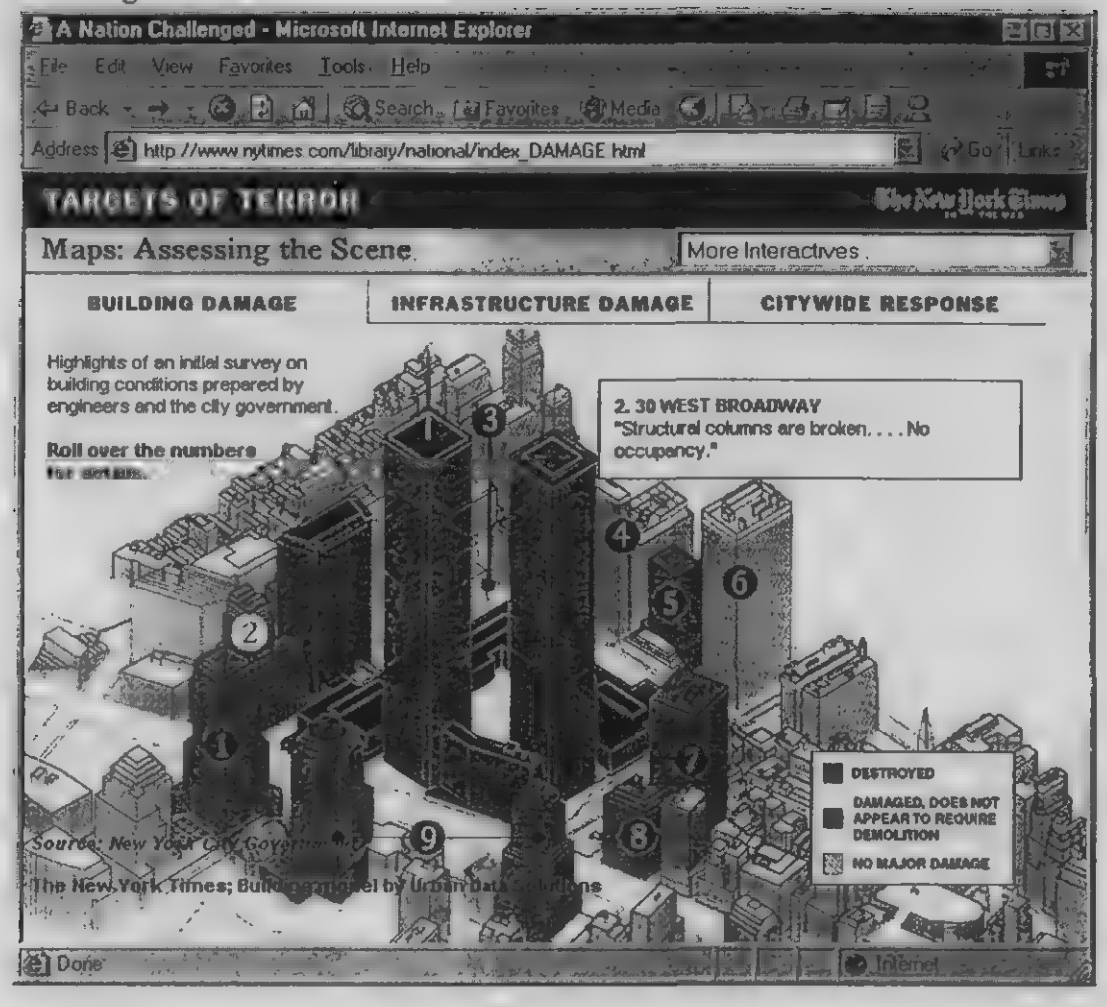
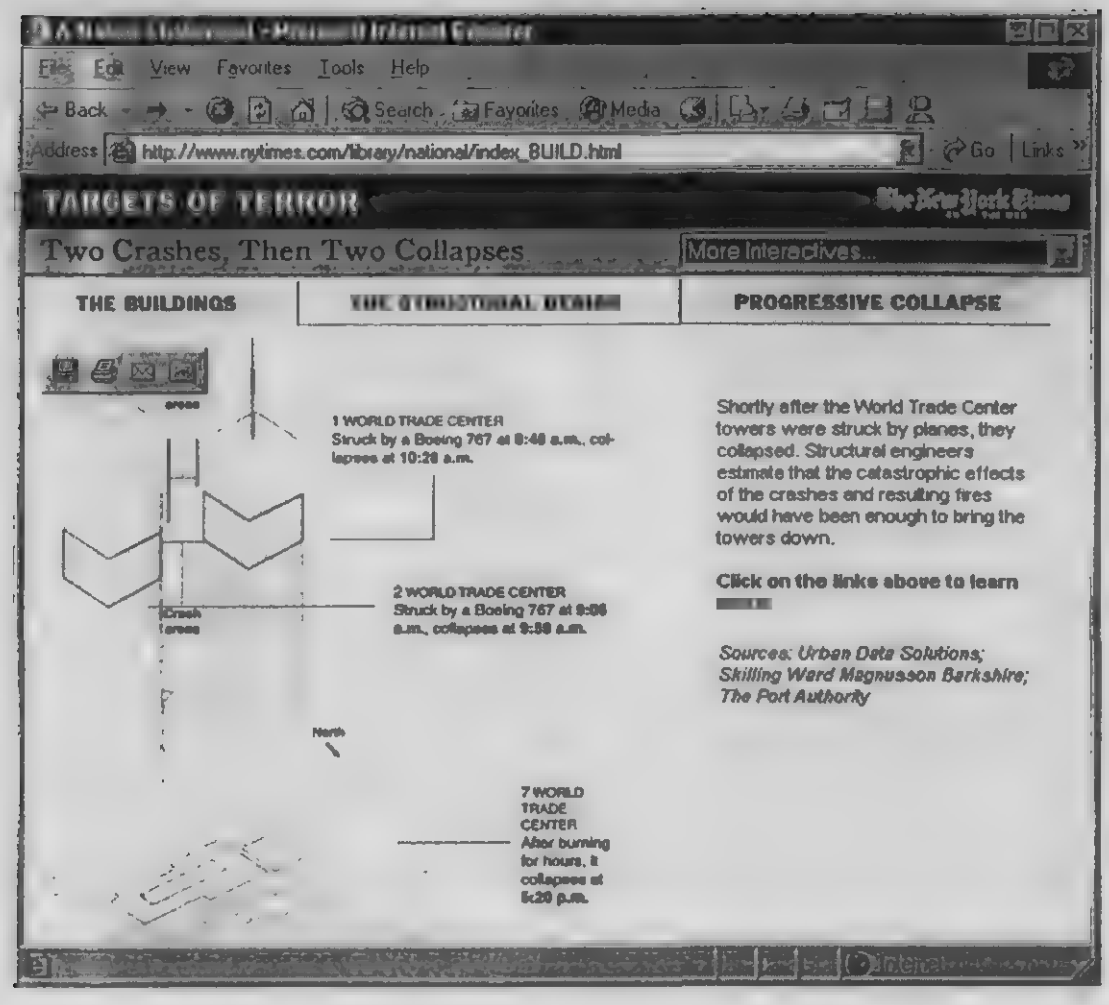
Assessing the scene

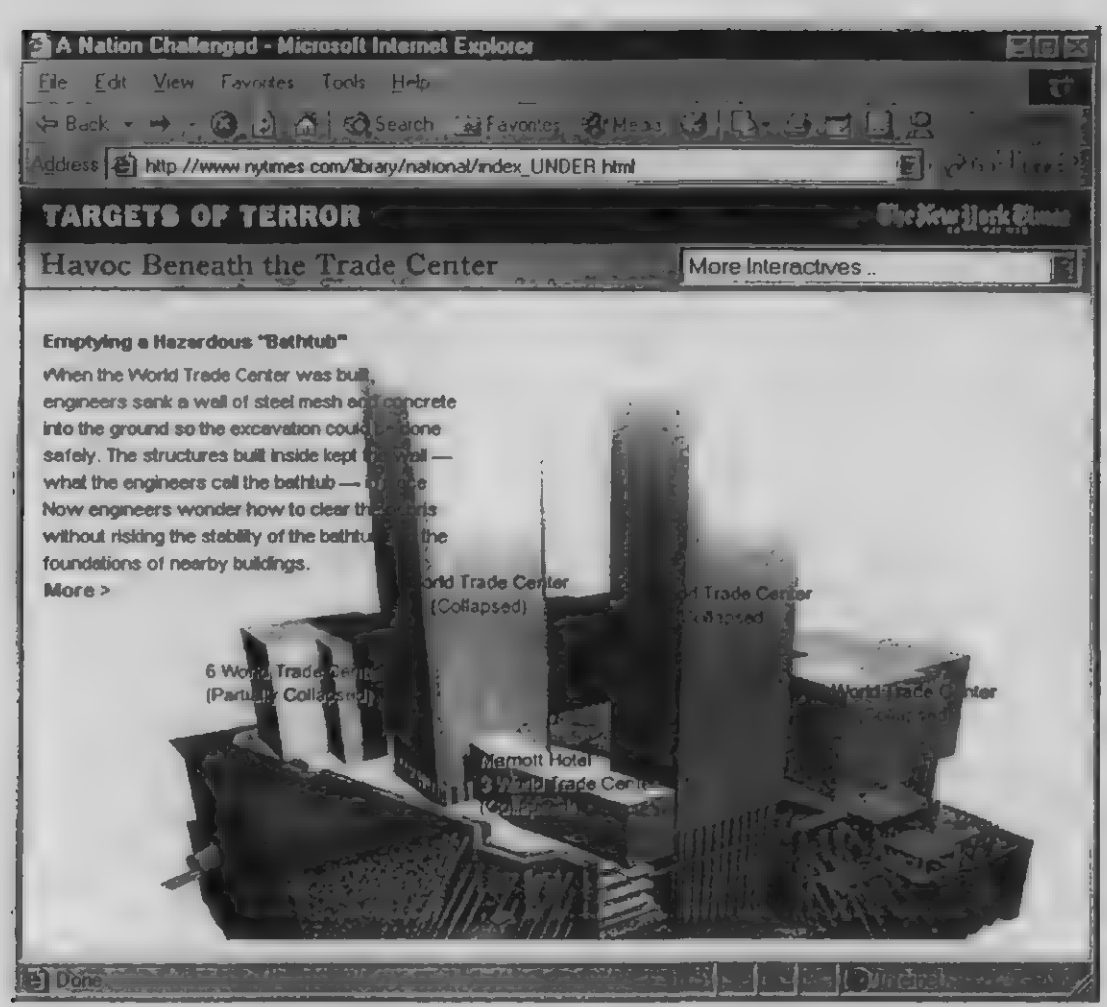


1 3 world financial center
2 30 west broadway
3 federal building
4 millenium Hilton
5 cortland street
6 1 liberty plaza
7 bankers trust
8 90 west street
9 1 and 2 world financial center

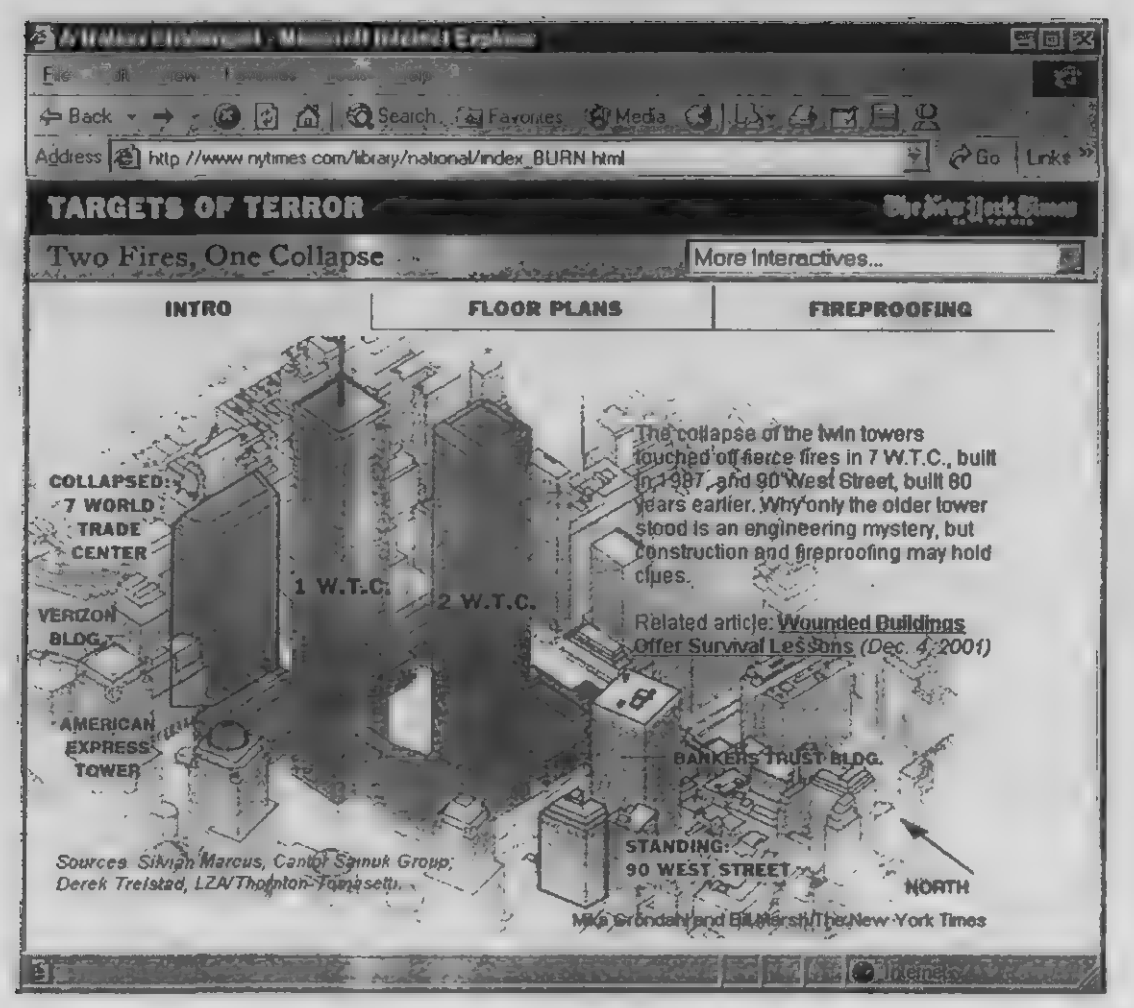
two crashes two collapses

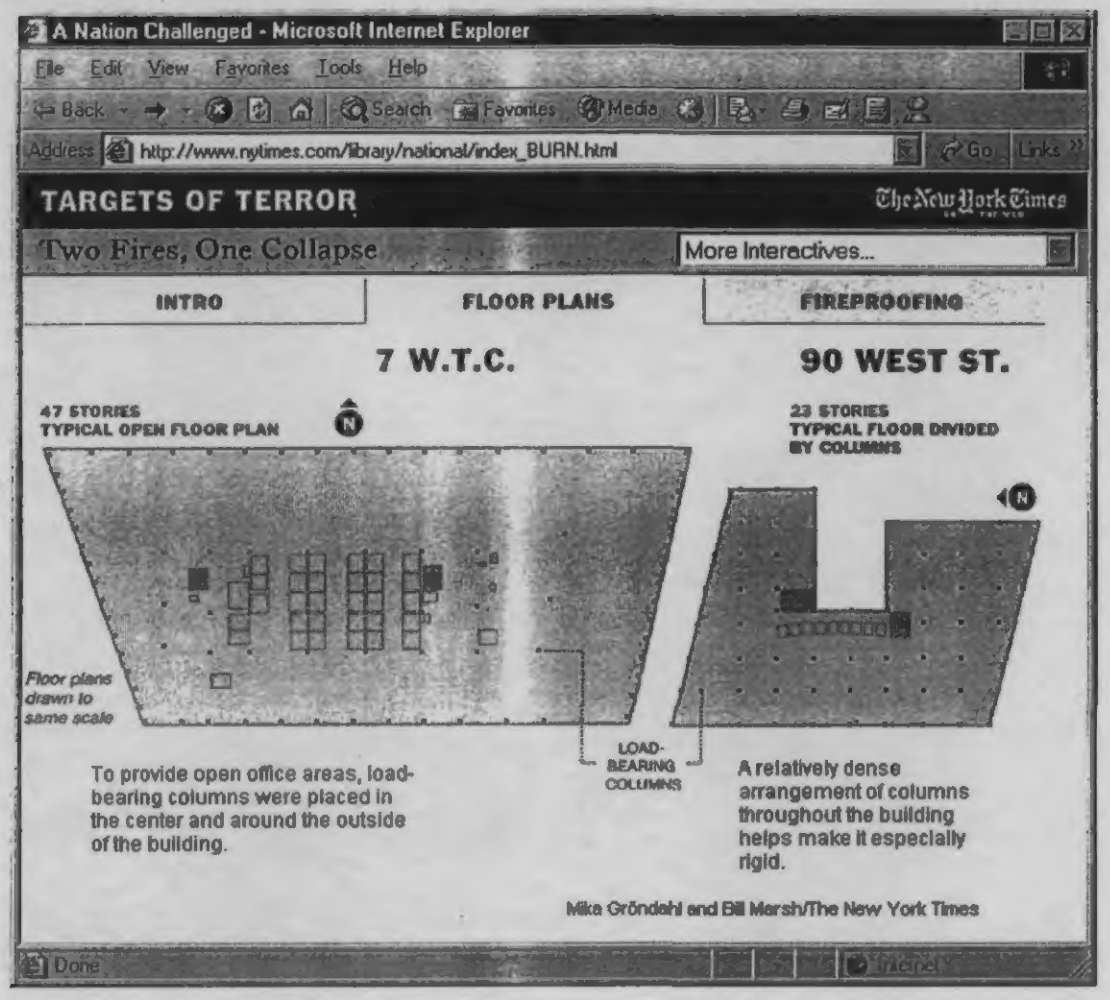


Havoc beneath the trade center



two fires one collapse

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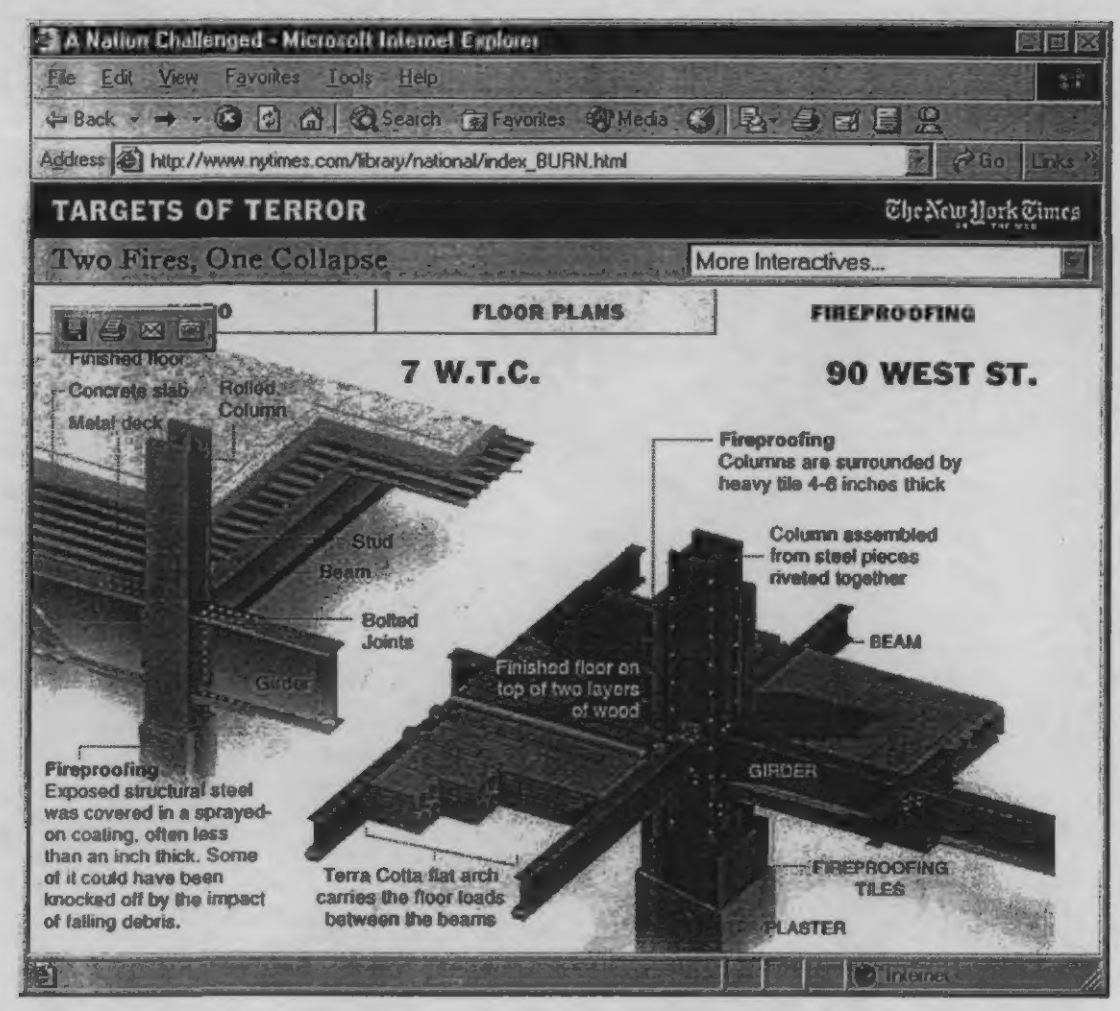
FLOOR PLANS
FIREPROOFING
7 W.T.C.
90 WEST ST.
47 STORIES
TYPICAL OPEN FLOOR PLAN
N
23 STORIES
TYPICAL FLOOR DIVIDED BY COLUMNS
N
Floor plans drawn to same scale
LOAD-BEARING COLUMNS
To provide open office areas, load-bearing columns were placed in the center and around the outside of the building.
A relatively dense arrangement of columns throughout the building helps make it especially rigid.
Mike Gröndahl and Bill Marsh/The New York Times
Done
Internet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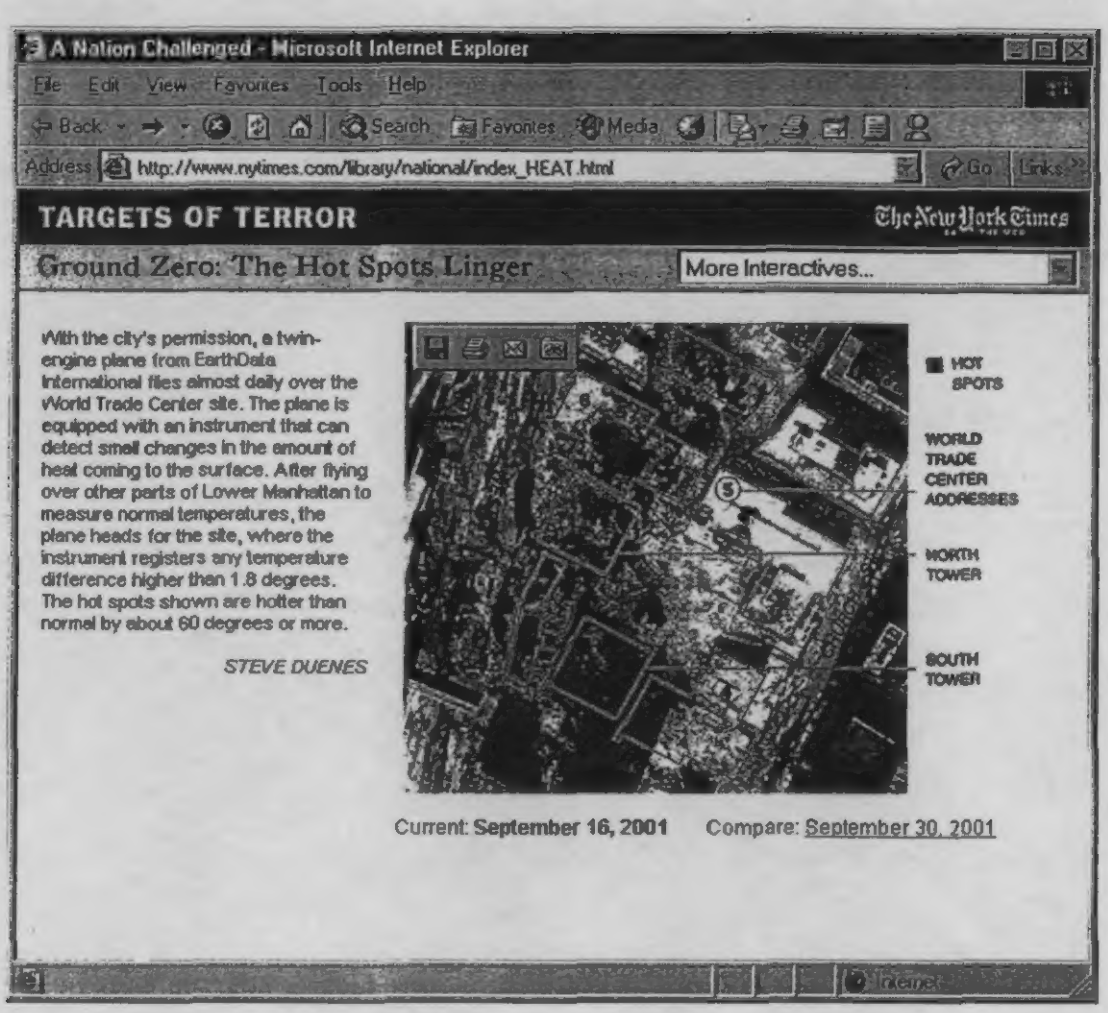
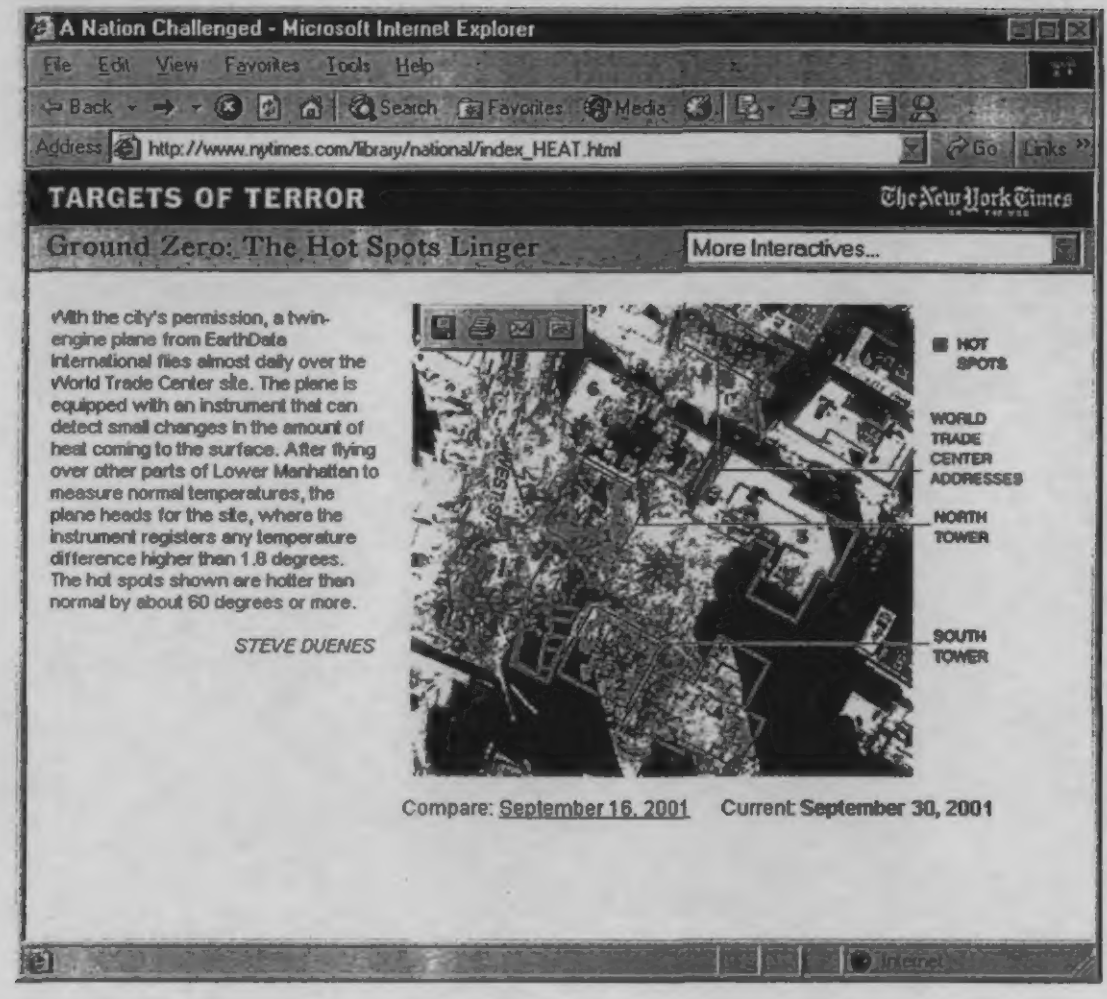
FLOOR PLANS
FIREPROOFING
7 W.T.C.
90 WEST ST.
Finished floor
Concrete slab
Rolled Column
Metal deck
Stud
Beam
Bolted Joints
Girder
Fireproofing
Exposed structural steel was covered in a sprayed-on coating, often less than an inch thick. Some of it could have been knocked off by the impact of falling debris.
Fireproofing
Columns are surrounded by heavy tile 4-6 inches thick
Column assembled from steel pieces riveted together
BEAM
Finished floor on top of two layers of wood
GIRDER
FIREPROOFING TILES
PLASTER
Terra Cotta flat arch carries the floor loads between the beams
Internet

hot spots linger



With the city's permission, a twin-engine plane from EarthData International flies almost daily over the World Trade Center site. The plane is equipped with an instrument that can detect small changes in the amount of heat coming to the surface. After flying over other parts of Lower Manhattan to measure normal temperatures, the plane heads for the site, where the instrument registers any temperature difference higher than 1.8 degrees. The hot spots shown are hotter than normal by about 60 degrees or more.

STEVE DUENES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Ground Zero: The Hot Spots Linger
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STEVE DUENES
HOT SPOTS
WORLD TRADE CENTER ADDRESSES
NORTH TOWER
SOUTH TOWER
Compare: September 16, 2001
Current: September 30, 2001
Internet